

NOTES ON CERTAIN GENERA OF NORTH AMERICAN GRASS-
HOPPERS OF THE SUBFAMILY OEDIPODINAE, WITH
THE DESCRIPTION OF A NEW GENUS AND
SPECIES (ORTHOPTERA : ACRIDIDAE).

By ASHLEY BUELL GURNEY,

Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture.

The comparatively full extent to which the grasshoppers of the United States are now known is indicated by the fact that of approximately 130 genera, only 3 have been described during the past 20 years which were not based at least in part on previously known species. Within the Oedipodinae, only one such genus (*Coniana* Caudell 1915) has been described since 1900. The receipt of a new species of Oedipodinae from New Mexico and the Mexican State of Durango, which represents a well marked new genus, is, therefore, of unusual interest. While it is true that most of the species and genera of Nearctic Acrididae have been described, much work remains to be done before the limits of many genera are satisfactorily known, thus permitting the definite generic assignment of certain species and the preparation of reliable keys.

The writer is indebted to J. R. Parker of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, and his associates at the Bozeman, Montana, laboratory, for making material of the new genus available and for the notes accompanying the specimens collected in New Mexico. Acknowledgment is also made of the privilege of studying the collections of Morgan Hebard and the Academy of Natural Sciences of Philadelphia. James A. G. Rehn of the latter institution has kindly placed those collections at the writer's disposal and has generously contributed numerous helpful suggestions.

The new genus is allied to *Hadrotettix* and the Group *Anconia*. A discussion of related genera follows the description. The preparation of a key distinguishing several genera seems advisable, and the author has chosen, somewhat arbitrarily, to treat those usually placed at the end of the subfamily, beginning with *Trimerotropis*. In Bruner's key (1905, p. 114), they are so placed and the relationship to other genera is indicated, but naturally several nomenclatorial changes and additions of new

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genera have since been made. It should be noted that in that key *Neracris* and *Shotwellia* would go in the first part of the subfamily, near *Arphia* Stål and *Chortophaga* Sauss., because of the narrow metasternal interspace. This character is important, but not worthy of the great importance assigned to it by Bruner. *Trepidulus* McNeill is actually closely related to *Derotmema* Scudd., because of the structure of the prozonal disk, which has conspicuous lateral prominences near the posterior margin, but in Bruner's key it falls near *Anconia*. With the exception of *Trimerotropis*, *Circotettix*, and *Aerochoreutes*, the genera in the following key agree in lacking definite lateral carinae of the pronotum, the disk rounding evenly into the lateral lobes except on the metazona, where there are rounded shoulders; the median carina of the pronotum is never carinate and is usually poorly developed or obsolete, except in the above genera, which are variable in these features. Actually, the generic limits of *Trimerotropis* and certain other genera will remain uncertain until much fuller studies than the present one are made, but the following key to one section of the Oedipodinae is made in the light of present information with the hope that it will be helpful. The most useful keys to the Oedipodinae, including Middle and Far Western genera, are those of Scudder (1897), Bruner (1905), Beamer (1917), Henderson (1924), and Hebard (1934, 1936), but a revised key containing all North American genera is much to be desired.

KEY TO THE NEW GENUS *Shotwellia* AND RELATED NORTH AMERICAN GENERA.

1. Posterior margin of disk of pronotum broadly rounded, about as in fig. 57
- Posterior margin of disk of pronotum less broadly rounded, varying from a condition about as in fig. 4 to distinctly acute. (Inner apical spurs of hind tibia not extremely long, as is true of *Spaniacris* (fig. 3), some specimens of which may appear to come here).....2
2. Tegmen with intercalary vein (fig. 9).....3
- Tegmen without intercalary vein (fig. 8).....6
3. Wing with swollen radiate veins; radiate field usually enlarged (fig. 13).....5
- Radiate veins normal; radiate field usually not enlarged (fig. 12).....4
4. Wing (fig. 12) with heavy dark band reaching to anal angle, without taenia extending toward base; inner surface of hind femur dark blue to apical third, except for narrow pale margins (fig. 17); median carina of prozona of pronotum subobsolete, rarely cut by anterior sulcus; antennae unusually long and enlarged.....
- Hadrotettix* Scudder
- Wing banded or not, but if so not as above and usually with taenia; inner surface of hind femur rarely approaching above condition; median carina of prozona usually carinate and cut by anterior sulcus, rarely subobsolete behind anterior sulcus or indistinctly cut by sulcus; antennae variable.....*Trimerotropis* Stål

5. Not all superjacent radiate veins of wing swollen (fig. 13); fastigium of male longer than wide.....*Circotettix* Scudder
- All superjacent radiate veins swollen; male fastigium as wide as long.....*Aerochoreutes* Rehn
6. Fastigium with lateral carinae strongly and abruptly convergent anterior to compound eye and then narrowly separated at apex (fig. 4); anterior margin of pronotum usually with two definite median adjacent convexities, these more developed in female than in male; apex of female subgenital plate with median projection; no wing band present.....*Cibolacris* Hebard
- Fastigium with lateral carinae converging gradually, widely separated at apex (fig. 7); anterior margin of pronotum without convexities; apex of female subgenital plate without median projection; wing band usually indicated.....*Helistus* Saussure
7. Hind femur very broad, inner surface with strong black pattern in basal two-thirds (figs. 1, 16).....*Shotwellia*, new genus
- Hind femur slender, not colored as above.....8
8. Metasternal interspace quadrate in female, elongate in male.....*Xeracris* Caudell
- Metasternal interspace transverse in female, quadrate or transverse in male.....9
9. Fastigium markedly produced in front of eyes, about as in *Shotwellia* (fig. 5); inner apical spurs of hind tibia moderately short (fig. 2). (Latero-posterior angles of lateral lobes of pronotum not produced caudad.).....*Anconia* Scudder
- Fastigium moderately produced in front of eyes and differently shaped, with lateral carinae converging rather abruptly and foveolae prominent; inner apical spurs of hind tibia long (fig. 3).....10
10. Compound eyes extending dorsad of level of vertex in lateral view (fig. 6), most markedly so in male; lateral lobes of pronotum not produced caudad; posterior margin of disk of pronotum bluntly, obtusely angulate; male with anterior margin of pronotal disk much elevated above level of principal sulcus in lateral view, female less so. (Approximate measurements of female: length of body 35 mm., of hind femur 27 mm., of tegmen 30 mm.).....*Spaniacris* Hebard
- Compound eyes not extending dorsad of level of vertex in lateral view (fig. 11); lateral lobes of pronotum produced caudad; posterior margin of pronotum evenly convex; anterior margin of pronotal disk moderately elevated above level of principal sulcus in lateral view. (Approximate measurements of female: length of body 19 mm., of hind femur 12 mm., of tegmen 20 mm.)...*Coniana* Caudell

SHOTWELLIA, new genus.

Generic description.—Size medium; form rather slender (male) to moderately robust (female); winged in both sexes. Head with vertex elevated above level of pronotal disk; face strongly (male) to moderately (female) retreating. Fastigium of vertex broadly excavate; lateral carinae raised and strongly but gradu-

ally converging anteriorly, separated at apex by distance subequal to width of first antennal segment. Foveolae visible from above, gently convex. Antennae moderately stout.

Pronotum with median line of disk nearly straight in lateral view; median carina cut by principal sulcus and imperfectly cut by two sulci of prozona; median carina distinct but scarcely raised on metazona, absent or subobsolete on posterior half of prozona; anterior margin fairly strongly (male) to slightly (female) convex; posterior margin broadly rounded; disk of lateral lobes broadly and shallowly concave, posterior margin not produced. Lateral carinae not indicated on prozona, very broadly rounded on metazona. Prosternum with a low transverse carina (male) or broadly and transversely convex (female). Mesosternal interspace quadrate or subquadrate; metasternal interspace elongate.

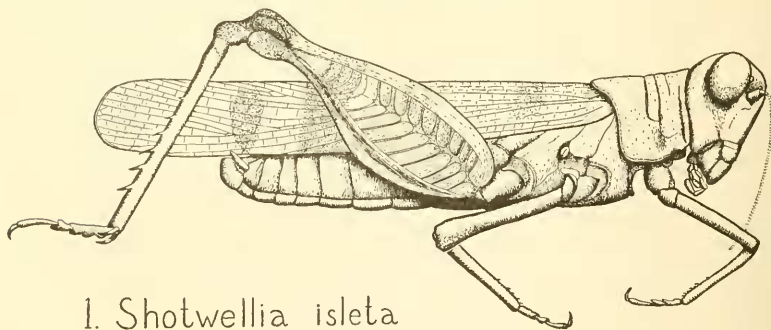
Front and middle legs of medium size; hind femur very broad, dorsal carina moderately, ventral carina strongly, lamellate; genicular lobes unarmed; Brunner's organ present.¹ Hind tibia with spines on external margin sparse; no external spines at apex; apical spurs of moderate length; inner spurs subequal. Tarsal claws simple; arolium very small.

Tegmen with intercalary vein well developed; cells in apical third elongate rectangular and regularly arranged, a few irregularly arranged subquadrate cells at apex. Wing well developed, of moderate width; margin of axillary field slightly lobate, of radial field evenly convex; radiate veins not swollen.

Abdomen moderately compressed. Female subgenital plate with posterior margin sinuate, a short, broadly triangular median projection. Ovipositor valves well extended and of moderate size.

The genus is named in honor of Robert L. Shotwell, of the Bureau of Entomology and Plant Quarantine, whose field studies of the grasshoppers of the West have been helpful in establishing a sound basis for work in biology and control.

Genotype.—*Shotwellia isleta*, new species.



1. *Shotwellia isleta*

New species, male holotype.

¹ Rehn (1923, p. 44) points out that this tooth has no diagnostic value, and Slifer and Uvarov (1938) show that with the exception of the Pneumorinae and Proscopinae Brunner's organ occurs in all the subfamilies of Acrididae.

Shotwellia isleta, new species.

Figs. 1, 5, 9, 10, 14-16, 18.

Male (holotype).—(Wings unspread.) Vertex evenly convex; dorsal level of eyes equal to that of vertex (fig. 1); frontal costa (fig. 10) shallowly sulcate ventrad of median ocellus, not developed on lower portion of face; (antennae missing); genae only moderately convex. Metazona (fig. 1) with disk nearly level; shallowly punctate on disk and lateral lobes. Meso- and metasterna as in fig. 14. Anterior sulcus poorly developed, scarcely cutting median carina; posterior sulcus of prozona well developed, except on disk, and intersecting carina with a low cut. Tegmen about as in female (fig. 9). Wings reaching tips of tegmina when closed. Front and middle femora smooth, convex dorsally and ventrally. Front and middle tibiae each with a cluster of small, well spaced, ventral spurs along apical third. Hind tibiae with number of external and inner spines 6-8 and 9-9, respectively; dorsal inner spur slightly shorter than ventral spur; external spurs slightly shorter than inner ones, and subequal to each other; ventral inner spur with several prominent setae on lateral surfaces. Claws and arolia about as in female (fig. 18). Subgenital plate bluntly conical at apex; cercus about $2\frac{1}{2}$ times as long as basal width, gradually tapering to blunt apex; supra-anal plate with smooth surface, the apex broadly triangular.

Coloration: General coloration pale brown (about as the average color of cork); compound eyes slightly darker; principal sulcus of pronotum, lateral extremities of sulcus anterior to it, spurs of front and middle tibiae, apices of hind tibial spines and spurs, and apices of tarsal claws black. Metazona tinged with reddish brown. Hind femur of same ground color, with pattern of black on inner surface as in female (fig. 16); apical lobes largely dark; two well marked dorsal bands of which the apical one is poorly developed and the basal one obsolete on external surface. Hind tibia fuscous at base, then an indefinite annulus of dirty white followed by yellow in the distal two-thirds. Tegmen as in female (fig. 9), with dark pattern grading from black at costal margin of largest band to pale fuscous in less developed areas. Abdomen slightly paler beneath; lateral surfaces of basal segments dark brown at base.

Measurements: Length of body 21.5 mm., of pronotum 4.5 mm., of tegmen 20 mm., of hind femur 11.7 mm., of hind tibia 10 mm.; greatest width of pronotum (caudal, including lateral lobes in perspective from above) 4.6 mm.

Female (allotype).—Differing from male as follows: Eyes slightly less prominent; fastigium with lateral carinae converging rather more strongly; frontal costa narrowing above antennal bases more gradually; median carina of prozona not cut by anterior sulcus, intersection by second sulcus scarcely indicated; anterior margin of pronotum only slightly convex; tegmen as illustrated (fig. 9); meso- and metasterna as in fig. 15; external and inner hind tibial spines 8-8 and 9-9, respectively; cercus triangular, less than twice as long as basal width; abdomen more compressed, ovipositor simple; scoop of dorsal valve well developed and with sharp, untoothed carinate margins.

Coloration: General coloration slightly darker than male. Wing transparent throughout, very pale yellow at base, then nearly colorless, grading into cloudy fuscous, the apex of anterior field nearly colorless. Sulci of pronotum, external apex of hind femur, and base of hind tibia less marked with dark than in male.

Measurements: Length of body 30 mm., of pronotum 5.8 mm., of tegmen 26 mm., of hind-femur 14.8 mm., of hind tibia 11 mm.; greatest width of pronotum 6 mm., of tegmen 4.5 mm.

In addition to the type and allotype described above, there is one female paratype which differs essentially from the allotype only in larger size and minor color features. Number of external and inner spines of hind tibiae 8-8 and 9-9, respectively. Pronotal sulci not darkened. Transverse fuscous band distad of the principal band considerably wider than in the allotype and practically fused with the three subapical spots. General color of the abdomen darker. Antennae (missing in allotype) dark brown. Measurements: (Abdomen abnormally distended), length of pronotum 6.8 mm., of tegmen 31 mm., of hind femur 18.6 mm., of hind tibia 14.4 mm., greatest width of pronotum 7.2 mm., of tegmen 5.7 mm.

Type locality.—Vicinity of Isleta Indian Reservation, Bernalillo County, N. Mex.

Type.—No. 53956, U. S. National Museum.

The type and allotype were collected at the type locality August 22-24, 1938, by Q. A. Hare, during surveys conducted by the Division of Cereal and Forage Insect Investigations, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture. Collections were made in range areas where dominant established grasses included *Bouteloua eriopoda* Torr., *Hilaria jamesii* (Torr.) Benth., *Muhlenbergia torreyi* (Kunth) Hitchc., and *Scleropogon brevifolius* Phil. In certain areas Bermuda grass (*Cynodon dactylon* (L.) pers.) and sedges (*Carex* sp.) were also dominant. The paratype was taken at Gomez Palacio, Durango, Mex., in May, 1918, by August Busck.

The type locality is in the Rio Grande Valley where the Upper Sonoran and Lower Sonoran Life Zones merge. Bailey (1913) has mapped and discussed the life zones of New Mexico, and says (p. 14), "The Rio Grande Valley from the Texas line north to Socorro is mainly Lower Sonoran, and traces of the zone extend north to Las Lunas and into the lower Puerco Valley." Typically, the Upper Sonoran is the plains zone of short grasses, while the Lower Sonoran is that of the creosote bush (*Covillea*) or southern desert shrubs. Gomez Palacio is near the Durango-Coahuila border about 300 miles south of Presidio, Tex., and nearly 700 miles from the type locality. It is in a small area of the short grass zone in which irrigation has permitted the growing of cotton. To the north desert extends to the Rio Grande, while northwestward is a vast area of *Covillea* association in Chihuahua (See Shelford, 1926).

REMARKS ON *Shotwellia* AND ALLIED GENERA.

In the current arrangement of American Oepipodinae, comprising about 50 genera, those from *Trimerotropis* on are grouped

at the end of the subfamily and include about a dozen Nearctic genera. To *Trimerotropis* there are now referred about 50 species and races. The nearest allies are *Conozoa* Saussure, *Circotettix*, and *Hadrotettix*. The genera preceding them include *Trachyrhachis* Scudder, *Psinidia* Stål, and their allies, but they need not be confused with *Trimerotropis* and are not discussed here. The need for a careful study and generic delimitation of *Trimerotropis* is exemplified by *T. bilobata* R. & H. and other species which are nearly as typical of *Conozoa* as of *Trimerotropis*; this fact was recognized by Rehn and Hebard (1906, p. 382) in describing *bilobata*. Most species of *Circotettix* are easily separable, generically, from *Trimerotropis*, as indicated in the key. However, Hebard (1928, p. 261) has pointed out the close affinities of *C. verrucullatus* (Kirby) and *T. suffusus* Scudd. (of which *T. obscura* Scudd. is a synonym according to Hebard, 1929, p. 362), and the wings are very similar in these two species. *Hadrotettix* is represented by only *trifasciatus* (Say) in this country, but a second species, *nebulosus* Scudd. of uncertain status, is recorded from Sinaloa, Mexico. Scudder (1900) assigned two other species to *Hadrotettix*, *mundus* Scudd. which belongs to *Trimerotropis* and *gracilis* Bruner, a synonym of *T. pistrinaria* Sauss. (See Hebard, 1929, p. 356; 1931, p. 165.) In some individuals of *T. strenua* McNeill the median carina is so poorly developed as to make separation from *Hadrotettix* on this character alone uncertain. Only rarely does the hind femur of *Trimerotropis* approach in breadth that of *Hadrotettix*. In breadth and degree of lamellation of the ventral carina *Hadrotettix* is suggestive of the Hippisci. *Hippiscus* Saussure and its allies are discussed by Hebard (1928, p. 236).

Circotettix and *Aerochoreutes* are the American genera of the group called the Bryodemae by Bey-Bienko (1930). The Old World genera considered by Bey-Bienko are *Bryodema* Fieb., *Angaracris* B.-B., *Uvaroviola* B.-B., and *Compsorhipis* Sauss.; the last genus was mistakenly given as *Cosmorrhhipis* Sauss. in error for *Cosmorrhhipis* J. & B., which was treated as a synonym of *Compsorhipis* by Kirby (1910, p. 262) and more recently by Bey-Bienko (1932). Of the Old World genera, one species of *Bryodema* alone occurs in Europe and Bey-Bienko considers it a relic of a postglacial westward invasion from Siberia. The other forms are all Asiatic, and he believes that the group, including the American genera, had its origin on the ancient continent of Angara. Schuchert (1931) has given a map showing Angara in the Upper Cretaceous; that this group is ancient is indicated by the fact that Pongrácz (1928) has described a fossil species of *Bryodema* from the Lower Miocene of Croatia. Except for the approach to *Trimerotropis* indicated above, *Circotettix* and *Aerochoreutes* are rather different from other American Acrididae, and if Bey-Bienko's belief be correct this

might explain the presence here of such a distinctive group, but in view of the convergence with *Trimerotropis* the two genera may actually be of American origin.

Rehn (1921) discussed the species of *Circotettix* (genotype, *undulatus* (Thos.)) and described *Aerochoreutes* (genotype, *carlinianus* (Thos.)). As there treated, *Circotettix* includes seven species and two additional races, while *Aerochoreutes* is composed of two races of *carlinianus*. The widely distributed *C. verrucullatus* (Kirby) was not included by Rehn and may require other generic status following study of *Trimerotropis*, though for convenience it is referred to *Circotettix* in current literature. The best single character distinguishing *Aerochoreutes* from *Circotettix* is that of all the dorsal radiate veins being swollen or not, as stated in the key. The genera are very close and it is difficult to depend on other features as single separating characters in all individuals.

The groups Heliasti and Anconiae have been discussed by Hebard (1937), the former including *Heliastus* and *Cibolacris*, the latter composed of *Anconia*, *Xeracris*, *Coniana* and *Spaniacris*. The Heliasti and Anconiae, though then not so called, were earlier reviewed by Caudell (1915). *Heliastus* has two species occurring in the United States, *benjamini* Caud. and *subrosens* Caud., and several others further southward. *Cibolacris* includes one known species, *parviceps* (F. Walk.), of which the typical race occurs in Mexico and two others, *arida* (Bruner) and *californica* (Thos.), are in the United States. Of the Anconiae, *Anconia* alone contains more than a single species; this genus has been discussed by Rehn (1919). *Spaniacris* was proposed by Hebard (1937) to replace the preoccupied *Ramona* Bruner.

Anconia stands somewhat apart from the other genera of Anconiae on the basis of the structure of the vertex and ovipositor. In *Xeracris*, *Coniana* and *Spaniacris* the apical hook of the lower valve of the ovipositor in ventral view is much narrower at base than the main body of the valve, the dorsal valve is short and the scoop greatly excavate, while the female subgenital plate is also specialized differently from that of *Anconia*. *Xeracris* is readily separated from *Coniana* and *Spaniacris* by the narrower metasternal interspace, but is much more closely related to them than to any other genera.

Among the New World genera which suggest *Shotwellia* in possessing a low median carina of the pronotum, though strikingly different in several other features, is *Sphingonotus* Fieb. In the above key *Sphingonotus* runs to *Trimerotropis*, and is easily separated from *Shotwellia* by the much broader metasternal interspace and the narrower hind femur. *Sphingonotus*, which is not definitely known from the mainland of North America, has been omitted from the key because of difficulty in

supplying constant characters to separate it from *Trimerotropis*. On the basis of genotypes, *T. maritima* (Harris) of the eastern part of the United States and the Palearctic *S. coeruleans* (L.), the two genera are amply distinct. In *Sphingonotus* the median carina of the prozona posterior to the anterior sulcus is obliterated and in most species a second sulcus cuts the median line of the disk anterior to the sulcus dividing prozona and metazona. In certain species of *Trimerotropis*, as *T. strenua* McNeill, some individuals occur the median carina of which is sufficiently obsolete as to make generic separation confusing. Hebard (1929, p. 357) has already suggested that certain species now assigned to *Trimerotropis* are not congeneric with *maritima* and that generic revision is needed.

Sphingonotus is chiefly a genus of the Old World, where it contains many species, and Bey-Bienko (1932) notes the resemblance of certain robust species to *Compsorhipis*, one of the Bryodemae. The following American species of *Sphingonotus* are known: *brasiliannus* Sauss. (Brazil); *cubensis* Sauss. (Cuba); *fusco-irroratus* (Stål) (Ecuador, Galapagos Islands); *haitensis* (Sauss.) (Jamaica, Hispaniola, Puerto Rico). Bruner (1906, p. 188) recorded *haitensis* from Mexico, but Rehn and Hebard (1938, p. 213) believe the identifications to be incorrect. The latter authors discuss *haitensis* and *cubensis* in detail, placing *jamaicensis* Sauss. as a synonym of *haitensis* and indicating that *cubensis* is a distinct species rather than a subspecies of *coeruleans* as originally described. Hebard (1920) has discussed *fusco-irroratus*. Kirby (1910, p. 278), in his catalogue, incorrectly assigned *Dissosteira venusta* (Stål) to *Sphingonotus* and on that basis recorded the genus from California. This species is not closely related to *Sphingonotus*.

Shotwellia has a combination of characters which, individually, are suggestive of several related genera: The head and pronotum of *Anconia*; the metasternal interspace of *Xeracris*; the hind legs of *Hadrotettix*. The ovipositor is not specialized and is similar to that of *Hadrotettix*.

To summarize the foregoing discussion, it is evident that *Trimerotropis* and *Hadrotettix* are closely related, and *Circo-tettix* and *Aerohoreutes* may represent a peculiar offshoot from a stock common with that of *Trimerotropis* in case they are of American origin. *Sphingonotus* and *Shotwellia* may be tentatively arranged following *Hadrotettix* and preceding the Heliasti and Anconiae.

There are several genera now referred to the subfamily Acridinae which are so suggestive of Oedipodinae as to merit consideration in identification work with the oedipodine genera discussed in this paper, though none is to be confused with *Shotwellia*. The author refers particularly to *Zapata* Bruner, *Aulocara* Scudd., *Drepanopterna* Rehn, *Goniatron* Bruner,

Ligurotettix McNeill, and *Heliaula* Caudell. The transfer of *Heliaula* to the Acridinae has only recently been suggested by Hebard (1937, p. 378), though the single species, *rufa* (Scudd.) was originally placed in the Acridinae previous to the description of *Heliaula*. Rehn (1923) has discussed *Goniatron* and *Ligurotettix* in detail. Mills and Pepper (1938, figs. 24, 25) have illustrated the female subgenital plates of *Aulocara* and *Drepanopterna*, which, together with other characters, separate those genera. Hebard (1926) gives a key to the acridine genera north of Mexico, subject to changes in the literature since its preparation.

SUMMARY.

Shotwellia isleta, a new genus and species of Oedipodinae from New Mexico and Durango, is described. A key to the genera usually arranged at the end of the subfamily, beginning with *Trimerotropis*, is given and the genera are discussed. *Shotwellia* shows relationship to *Hadrotettix* and the Anconinae in particular.

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EXPLANATION OF FIGURES.

Plate 1.

- Fig. 2. *Anconia integra* Scudder, male, inner view of apex of hind tibia and first tarsal segment. Phoenix, Ariz., Sept. 29, 1900.
- Fig. 3. *Spaniacris deserticola* (Bruner), male, same view as in fig. 2. Indio, Calif., June 5.
- Fig. 4. *Cibolacris parviceps arida* (Bruner), female, dorsal view of head and pronotum. Tempe, Ariz., Aug. 27, 1918.
- Fig. 5. *Shotwellia isleta*, new species, male holotype, same view as in fig. 4.

Plate 2.

- Fig. 6. *Spaniacris deserticola* (Bruner), male, lateral view of head and pronotum. Indio, Calif., June 5.
- Fig. 7. *Heliasius benjamini* Caudell, female holotype, dorsal view of head. Huachuca Mts., Ariz., Aug. 16, 1903. (Type designated in 1912.)
- Fig. 8. Same, female, portion of left tegmen. Cochise County, Ariz.
Abbreviations: *h*, humeral vein; *d*, discoidal vein; *m*, median vein; *au*, anterior ulnar vein; *iv*, intercalary vein. Terminology after Saussure's *Prodromus Oedipodiorum*, 1884.
- Fig. 9. *Shotwellia isleta*, new species, female allotype, left tegmen.
- Fig. 10. Same, male holotype, anterior view of head.
- Fig. 11. *Coniana snowi* Caudell, male, lateral view of head and thorax. Phoenix, Ariz., July 20, 1913.

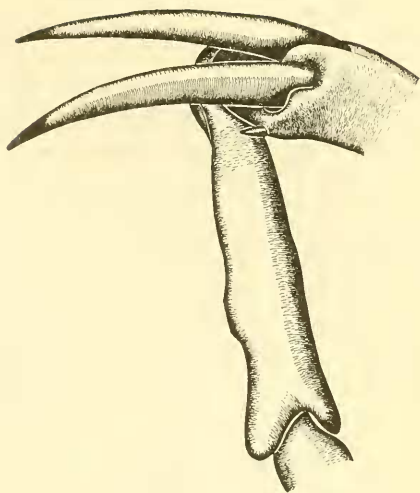
Plate 3.

- Fig. 12. *Hadrotettix trifasciatus* (Say), female, left wing. Gainsville, Tex., Sept. 26, 1922.
- Fig. 13. *Circotettix undulatus* (Thomas), male holotype, left wing. "Col. Terr" (Type selected by Rehn in 1921.)
- Fig. 14. *Shotwellia isleta*, new species, male holotype, ventral view of meso- and metasternum.
- Fig. 15. Same, female allotype, same view.
- Fig. 16. Same, female paratype, inner surface of right hind femur.
- Fig. 17. *Hadrotettix trifasciatus* (Say), female, same view as in fig. 16. Same specimen as in fig. 12.
- Fig. 18. *Shotwellia isleta*, new species, female allotype, apex of left hind tarsus.

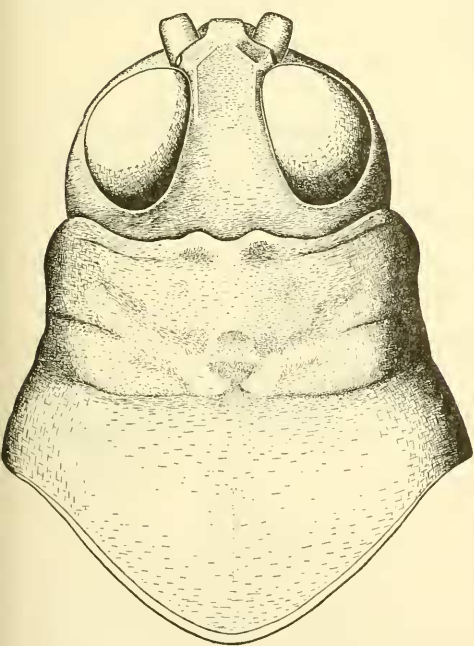
(All drawings by the author.)



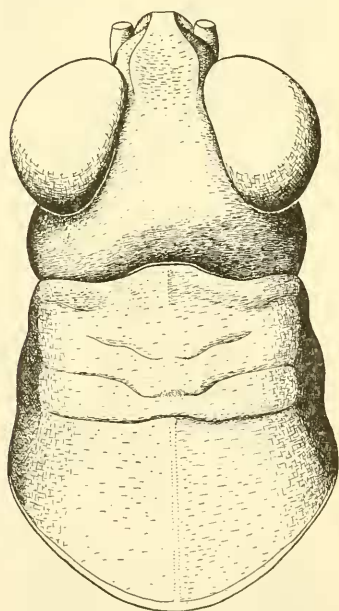
2. *Anconia*



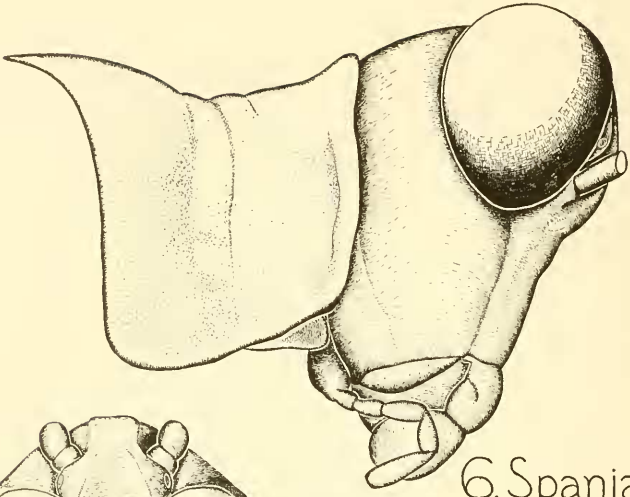
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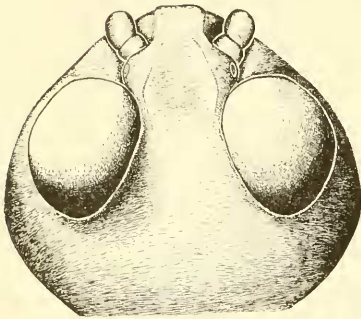
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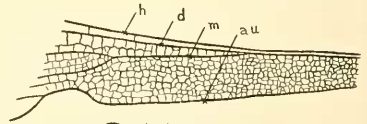
5. *Shotwellia* ♂
[13]



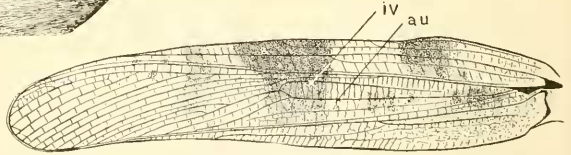
6. Spaniacris



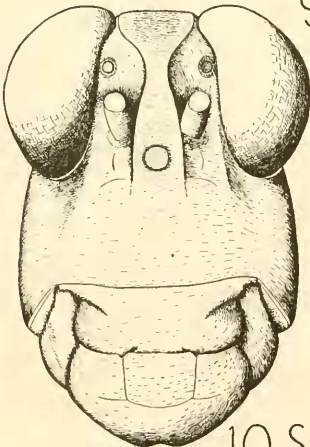
7. Heliastus



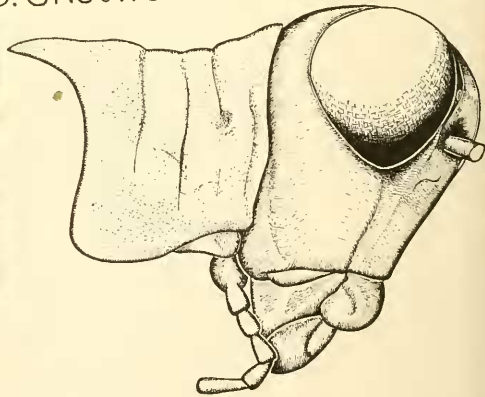
8. Heliastus



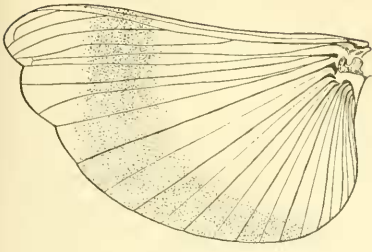
9. Shotwellia



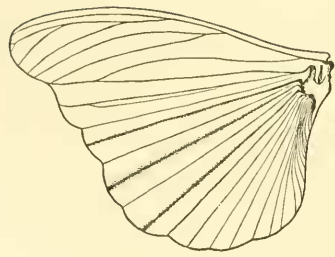
10. Shotwellia



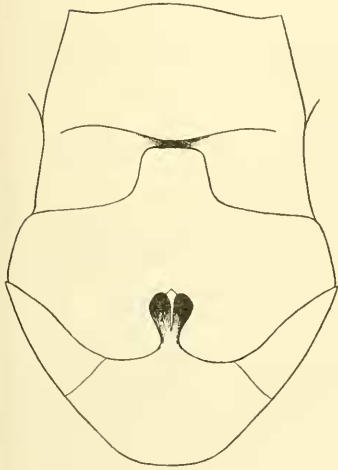
11. Coniana



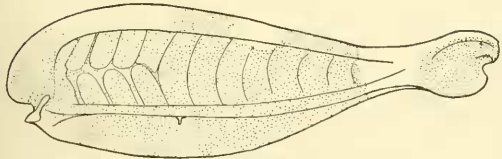
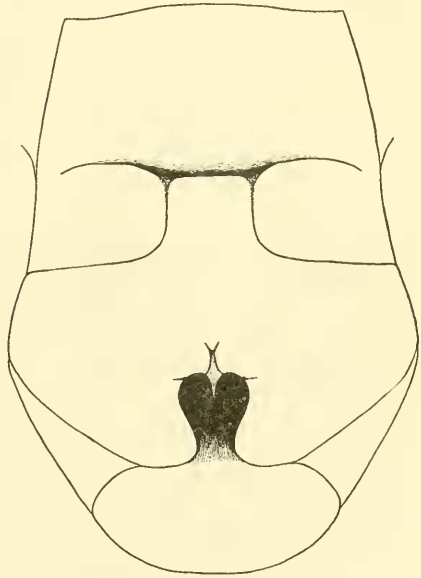
12. Hadrotettix



13. Circotettix

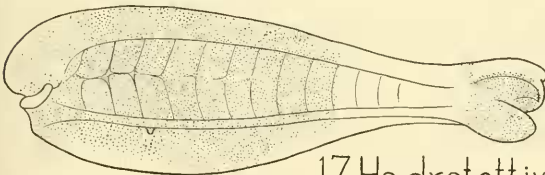


14. Shotwellia ♂

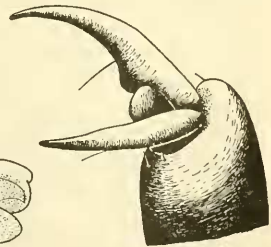


15. Shotwellia ♀

16. Shotwellia



17. Hadrotettix



18. Shotwellia